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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/730,747	12/08/2003	Robert M. Koehl	085455-9455-00	2653

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EXAMINER	
SAYOC, EMMANUEL	
ART UNIT	**PAPER NUMBER**
3746	

DATE MAILED: 07/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/730,747	KOEHL, ROBERT M.	
	Examiner	Art Unit	
	Emmanuel Sayoc	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a).. In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *20-35 and 87* is/are pending in the application.

4a) Of the above claim(s) *9-19,36-63 and 72-76* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *20-35 and 87* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/18/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the amendments of 5/6/2005. In making the below rejections and/or objections the examiner has considered and addressed each of the applicants arguments. Claims 20-35, and 87 are pending, and are under current consideration. Claims 1-8, 64-71, and 77-86 have been cancelled, and claims 9-19, 36-63,and 72-76 are withdrawn.

Election/Restrictions

2. Applicant's election without traverse of Group II., claims 9-63, and 72-76, and species B in the reply filed on 5/6/05 is acknowledged.

Claims 9-19, 36-63,and 72-76 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 5/6/05.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 20, 21, 28, 29, 32, 33 and 87 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meza et al. (U.S. Pat. App, 2004/0009075), and Konrad (U.S. 5,883,489) as a supporting (rather than modifying) reference.

Meza et al. in Figure 4, teach a pump and control circuit apparatus and method comprising measuring current being provided to the motor via current measuring circuit (212), and determining whether the current is greater than a limp current limit setting (see paragraph 14). Since the power source (202, 206) supplies power to the motor, the current measurement constitutes a measurement of bus current, or line current. The current limit setting constitutes a programmed threshold. As is consistent with the applicant's specification, the terms "limp mode" and "limp current limit" are interpreted to be a state of pump motor operation at reduced power (reduced voltage and current to the motor), and the limit at which this state occurs, respectively. As is further described, if the sensed current exceeds a current limit value (which constitutes a limp current limit), the microcontroller (214) reduces power to the motor. The pump motor is energized using pulse width modulation (PWM, see paragraph 103). Within the art it was well known to use inverters to provide pulse width modulation to generate variable frequency and voltage power to pump motors. Konrad in Figure 1, teaches a pump with PWM and an inverter controller (7). Konrad teaches that increasing the motor frequency, gradually increases the power to the motor (2) and hence the speed of the motor (2), see column 11 lines 1-35. It is evident that in PWM of power to a motor that frequency, current, and voltage are proportional to the duty cycle of the PWM.

Therefore it follows that in the PWM implementation in Meza et al., that the reduction in power (due to the bus current being greater than a current limit value), is achieved by directly or indirectly reducing voltage and/or frequency. This operation at reduced power constitutes operation in a limp mode.

The Meza et al. device differs from the claimed invention in that there is no explicit teaching of shutting down the motor if the motor does not operate within operational limits while being driven in the limp mode. It was well known in the art to shut-off a pump motor in adverse conditions such as excessive pressure, temperature, or current levels. In paragraphs 14, 16, 86, and 103, Meza et al. teach sensing pressure levels via sensors (116) and comparison with a pressure shut-off value. In paragraph 14, it is taught that the current limit value can be adjusted in accordance to the relationship between the pressure shut-off value and the measured pressure. As stated above the reduced power or limp mode is an operation to reduce current to bring the motor within normal operational parameters such as pressure, current and temperature levels. Paragraph 18, 142, and 143 teach that temperature sensors (579) sense motor temperature, and adjust the current limit value and current limit to stabilize motor temperature. The temperature reading indicates the temperature of the surface of the pump (see paragraph 18), which constitutes a heat sink. As taught by Meza et al., the motor is shut down as the reduced power operation or limp mode operation does not bring about normal operational pressures - see paragraph 110, and 145. It would have been obvious to shut down the motor for other adverse parameters such as excessive motor current and temperature in order to prevent motor damage. This is

supported in paragraph 7, where it is stated that excess current leads to high temperatures and motor damage.

The Meza et al. motor is driven in the limp mode without generating a fault condition code.

5. Claims 24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meza et al., and Konrad (U.S. 5,883,489) as a supporting reference, as applied to claim 20, and in further view of Denpou. (U.S. 4,912,936).

The Meza et al., as supported by Konrad, device set forth a device as described above, which is substantially analogous to the claimed invention. The Meza et al., as supported by Konrad, device differs from the claimed invention in that there is no teaching of the voltage detected being compared to a voltage threshold. Denpou in Figure 1 teaches a compressor control system that detects voltage to the compressor (9), via detector (19). The control circuit (29) compares the voltage to reference values to accordingly drive the compressor (9). Under constant power supply to the compressor, which is the case here and in Meza et al., the supply voltage is proportional to the current. Therefore similar motor operation information can be obtained from the voltage as with the current. This is suggested in the Abstract line 18.

Therefore it would have been obvious to one of ordinary skill in the art at time the invention was made to modify the Meza et al., as supported by Konrad, device by, basing control off a supply voltage reading and voltage comparison, as taught by

Denpou, as a functional equivalent of the current detecting schema. As the applicant has presented various alternatives of parameters measured (current, voltage, and temperature), it is evident that the particular parameter measured is not a critical or central aspect to the claimed invention, and that the control methods using different parameters are functionally equivalent. The applicant has not provided an indication why a particular parameter is critical, or unexpectedly advantageous over another. Finally the Meza et al. device would certainly function substantially the same using voltage as a controlling parameter in place of current.

6. Claims 22, 23, 30, 31, 34, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meza et al., as supported by Konrad , as applied to claims 20, 28, and 32, and in further view of Lane Jr. (U.S. 5,512,883).

The Meza et al. device set forth a device as described above, which is substantially analogous to the claimed invention. The Meza et al. device differs from the claimed invention in that there is no teaching of generating the fault condition code while shutting down the motor or indicating to a user that the motor is operating in the limp mode. One of ordinary skill would have appreciated that it is important for a user to be able to interact and monitor the operation of a pump in order to better ensure operation safety and efficiency. Lane Jr. in Figure 1, teaches a method and device for monitoring the operation of a motor, which is usable on a pump. In column 1 lines 17-20, Lane Jr. teaches that the current drawn by a motor is indicative of the operating

condition of the motor. If the current level is too small, the motor may not be able to sufficiently provide enough power to the application, and if the current is too large the motor may wear or be damaged, thus it is clearly important to monitor the motor current. In column 1 lines 55-67, the Lane Jr. device produces an alarm such that the controller or the operator can recognize the malfunction for subsequent diagnosis, correction or shut-off for motor protection. The current is sensed by a transducer (144) and compared to minimum and maximum thresholds. In column 3 lines 60 to column 4 line 13, the monitoring device (100) stored a plurality of events including error conditions such as high current event (118), low current event (120), and sustained high current (122). Error codes are displayed on an error condition display (108). In column 5 lines 28-34, Lane Jr. teaches that the motor is controlled according to current conditions, and is suitable for compressor motors. Therefore it would have been obvious to one of ordinary skill in the art at time the invention was made to modify the Meza et al. device by generating the fault or error condition code while shutting down the motor or indicating to a user that the motor is operating in the reduced power or limp mode, as taught by lane Jr., in order to advantageously notify the operator such that the malfunction can be recognized for subsequent diagnosis, correction or shut-off for motor protection.

7. Claims 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meza et al., as supported by Konrad, and in view of Denpou, as applied to claim 24, and in further view of Lane Jr. (U.S. 5,512,883).

Meza et al. set forth a device as described above, which is substantially analogous to the claimed invention. The Meza et al. device differs from the claimed invention in that there is no teaching of generating the fault condition code while shutting down the motor or indicating to a user that the motor is operating in the limp mode. One of ordinary skill would have appreciated that it is important for a user to be able to interact and monitor the operation of a pump in order to better ensure operation safety and efficiency. Lane Jr. in Figure 1, teaches a method and device for monitoring the operation of a motor, which is usable on a pump. In column 1 lines 17-20, Lane Jr. teaches that the current drawn by a motor is indicative of the operating condition of the motor. If the current level is too small, the motor may not be able to sufficiently provide enough power to the application, and if the current is too large the motor may wear or be damaged, thus it is clearly important to monitor the motor current. In column 1 lines 55-67, the Lane Jr. device produces an alarm such that the controller or the operator can recognize the malfunction for subsequent diagnosis, correction or shut-off for motor protection. The current us sensed by a transducer (144) and compared to minimum and maximum thresholds. In column 3 lines 60 to column 4 line 13, the monitoring device (100) stored a plurality of events including error conditions such as high current event (118), low current event (120), and sustained high current (122). Error codes are

displayed on an error condition display (108). In column 5 lines 28-34, Lane Jr. teaches that the motor is controlled according to current conditions, and is suitable for compressor motors. Therefore it would have been obvious to one of ordinary skill in the art at time the invention was made to modify the Meza et al. device by generating the fault or error condition code while shutting down the motor or indicating to a user that the motor is operating in the reduced power or limp mode, as taught by Lane Jr., in order to advantageously notify the operator such that the malfunction can be recognized for subsequent diagnosis, correction or shut-off for motor protection.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references are cited to further show the state of the art with respect to pump control.

U.S. Pat. 6,623,245 B1 to Meza et al. – teach a current and temperature sensing pump controller

U.S. Pat. 4,353,220 to Curwen et al. – teach temperature measurement and compressor shut down in error conditions

U.S. Pat. 3,787,882 to Fillmore et al. – teach general nature of the art

U.S. Pat. 6,102,665 to Centers et al. – teach a compressor shut down in various parameter measurement in excess of threshold

U.S. Pat. 5,342,176 to Redlich – teaches compressor control based on voltage and current readings

Contact Information

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Sayoc whose telephone number is (571) 272 4832. The examiner can normally be reached on M-F 8-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy S. Thorpe can be reached on (571) 272-4444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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